Syncope

T. D. Ostronic, MD
WRAMC Cardiology Service
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Outline

- Definition
- Pathophysiology
- Classification / Evaluation / Management*
  - 1st episode

Syncope

- Definition
  - sudden loss of conciousness
  - loss of postural tone
  - spontaneous recovery

Syncope

- Epidemiology
  - 3% of ER visits
  - 30% with recurrence

Framingham data,1

Syncope

Age	Prevalence*
35-55	1%
55-65	2%
65-75	3%
>75	5%

Significance of Syncope

1. Trauma

2. Psychologically disabling

3. Evidence of underlying disease
   - identification
   - prognosis

Pathophysiology*

- Cerebral hypoperfusion
  - heart rate
  - peripheral vasodilation
  - cerebral auto-regulation problems
  - neurocardiogenic reflex
    - afferents
      - cardiac chambers
      - carotid sinus
      - brain (including higher cortical centers)
      - viscera
      - others?

Pathophysiology

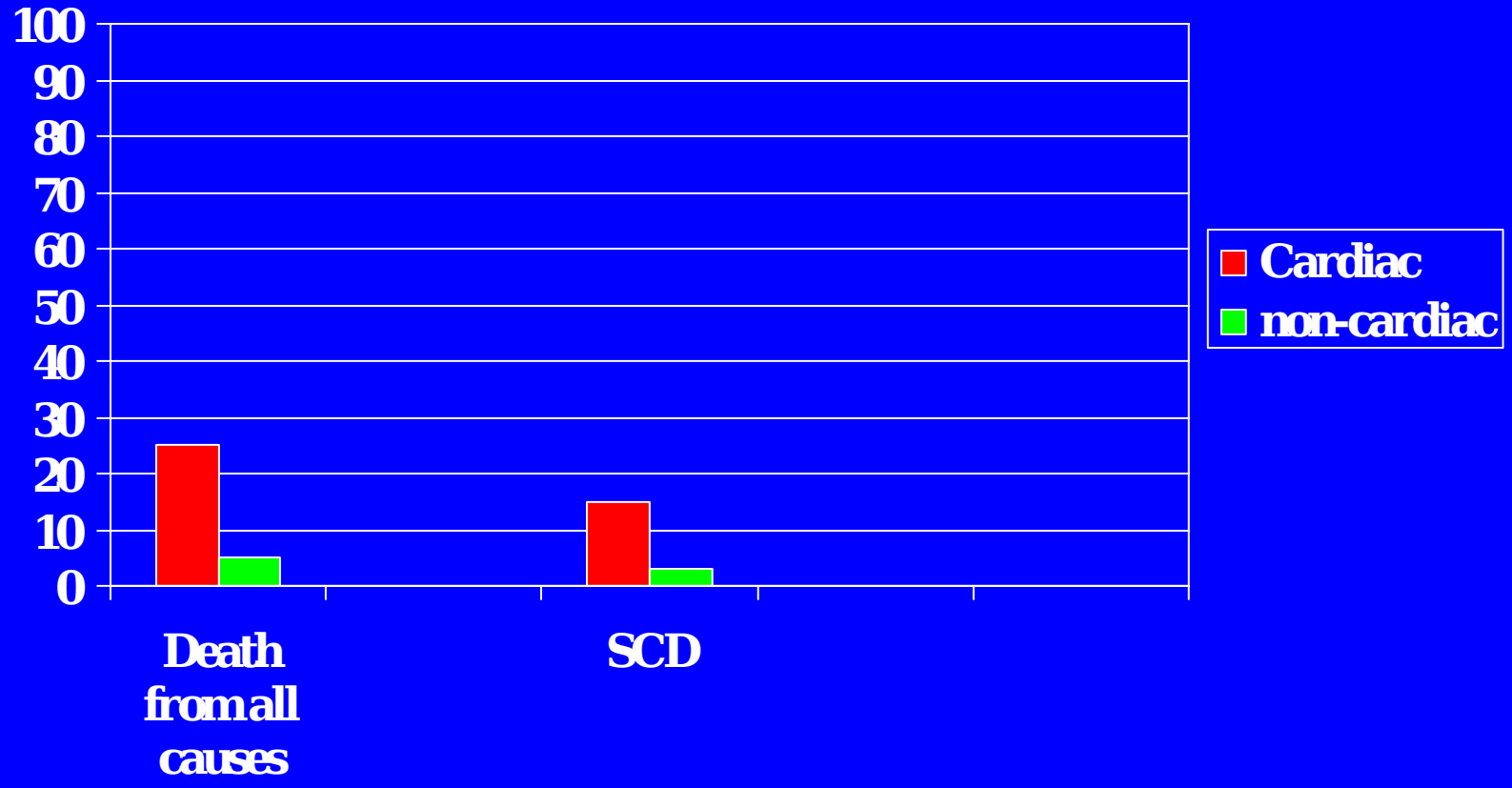
- Complexity of pathophysiology makes classification difficult

Classification of syncope

- “Cardiac” (20%)
- “Non-cardiac” (50%)
- Unknown etiology (30%)

Syncope

% Mortality at 1 year



Kapoor;Medicine

Syncope

% Mortality at 5 years

Kapoor;Medicine

Syncope

"Cardiac" etiologies

1. Heart
   - **arrhythmia** (85%)
   - **mechanical obstruction** (5%)
   - **mi** (5%)
2. Lung
   - pulm embolus
   - pulm hypertension

3.Aortic dissection

Kapoor;Medicine 19

Arrhythmias causing syncope

1. Bradycardia
   - sinus node
   - av node
   - his-purkinje
2. Tachycardia
   - **vtach**
   - atrial tach
   - afib/flutter
   - avnrt/avrt

Syncope

"Non-cardiac" etiologies

1. Vascular
   - **vaso-vagal** (50%)
   - **orthostasis** (30%)
   - subclavian steal

2. Neuro-psych
   - seizure
   - tia
   - conversion reaction

3. Drugs

Kapoor;Medicine 19

Syncope evaluation
major focus

Identify and treat **underlying heart disease**.

Syncope

"Cardiac" etiologies

1. Heart
   - **arrhythmia** (85%)
   - **mechanical obstruction** (5%)
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2. Lung
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Kapoor;Medicine 19

Syncope evaluation
Initial eval

- H&P
- ECG

Diagnostic in ~50% of all cases*

Linzer et al; Annals IM 1997

Syncope unexplained after H&P, Ecg:
1st episode

<60 yo

No evidence of ht dz

(observe)

Suspect ht dz

Echo

GXT

≥ 60 yo

Echo

GXT

(Carotid massage)

Linzer et al; Annals

Evaluation of syncope

- H&P
- ecg
- echo
- gxt
- carotid massage

H&P

- ~500 pts with syncope
  - 45% diagnosed by h&p
    - all noncardiac
- 275 pts needed further eval
  - 20% diagnosed with arryhthmic etiology
  - attempt to correlate sx with etiology

Oh :Arch Int

H&P
20 symptoms evaluated

- cp, palps, sob
- injury
- duration of loss of consciousness
- nausea, vomiting
- visual changes
- sweats
- fatigue, weakness
- flushing, tingling
- incontinence
- tonic/clonic movement

Oh :Arch Int

H&P

- No correlation of any sx with arrhythmic etiology
- Conclusion
  - H&P useful for making dx of noncardiac etiologies
  - Symptoms not useful for determining arrhythmic etiology in pts who require further evaluation

Oh :Arch Int

ECG

- ~50% of syncope pts with abnormal ecg
  - identifies probable cause in 5%
  - useful in directing further eval
    - heart block, bundle branch block
    - q-waves
    - long QT
    - WPW
- Normal ecg with normal H&P indicates extremely low risk for sudden death.

ECG

- 433 pts with syncope
  - 30 pts with diagnostic ecg (7%)
    - acute mi in 5
    - arrhythmia in 25

Kapoor;Medicine,1990

ECG

- ~500 pts with syncope
  - 45% diagnosed by h&p
    - all non-cardiac
- 275 pts needed further eval
  - abnl ecg => RR of arrhythmic etiology ~25%

Oh :Arch Int

ECG

- ~250 pts with syncope
  - 55% with abnormal ecg
    - 7% with acute mi, unstable angina
      - st elevation (13)
      - st depression ((5)
      - q-waves (3)
      - t-wave abnormalities (14)
  - 45% with normal ecg
    - none with ischemia

Georgeson et

Echo

- Looking for
  - LVEF
  - obstruction

Utility of Echo

- 345 consecutive pts echoed at Beth Israel
- Compare clinical suspicion with echo results
  - ~40% attendings
  - ~60% housestaff

Krumholtz et

Utility of Echo

- Diagnoses missed by H&P
  - ~20% of pts with lvef < 50% (12/59)
  - ~20% of pts with lvef < 20% (3/14)
  - ~10% of pts with severe aortic stenosis (3/27)

Krumholtz et

Clinical estimate vs Muga

- ~100 pts with chronic ascad
- clinical evaluation by cardiologist
- compare with Muga

Mattleman et

Clinical estimate vs Muga

- Results
  - lvef > 50%: (75% accuracy)
  - lvef 30-50% (50% accuracy)
  - lvef < 30% (50% accuracy)

- Overall accuracy of determining abnormal ef: ~80%

Mattleman et

Indications for echo in syncope

ACC/AHA guidelines

- Class I
  - clinically suspected ht dz
  - exertional syncope
- Class IIa ("probably helpful")
  - pt with high risk occupation
- Class IIb ("possibly helpful")
  - unexplained syncope, normal cardiac h&p

Prognosis based on Echo

- Prognosis of underlying disease
- If etiology still not known, prognosis correlates with lvef.

Predictive value of LVEF

- 88 pts with syncope
- Referred for eps
  - 55% dx'd with cardiac etiology
  - 45% still w/o dx after eps
- F/u for ~2-3 yrs
- Evaluate for sudden cardiac death

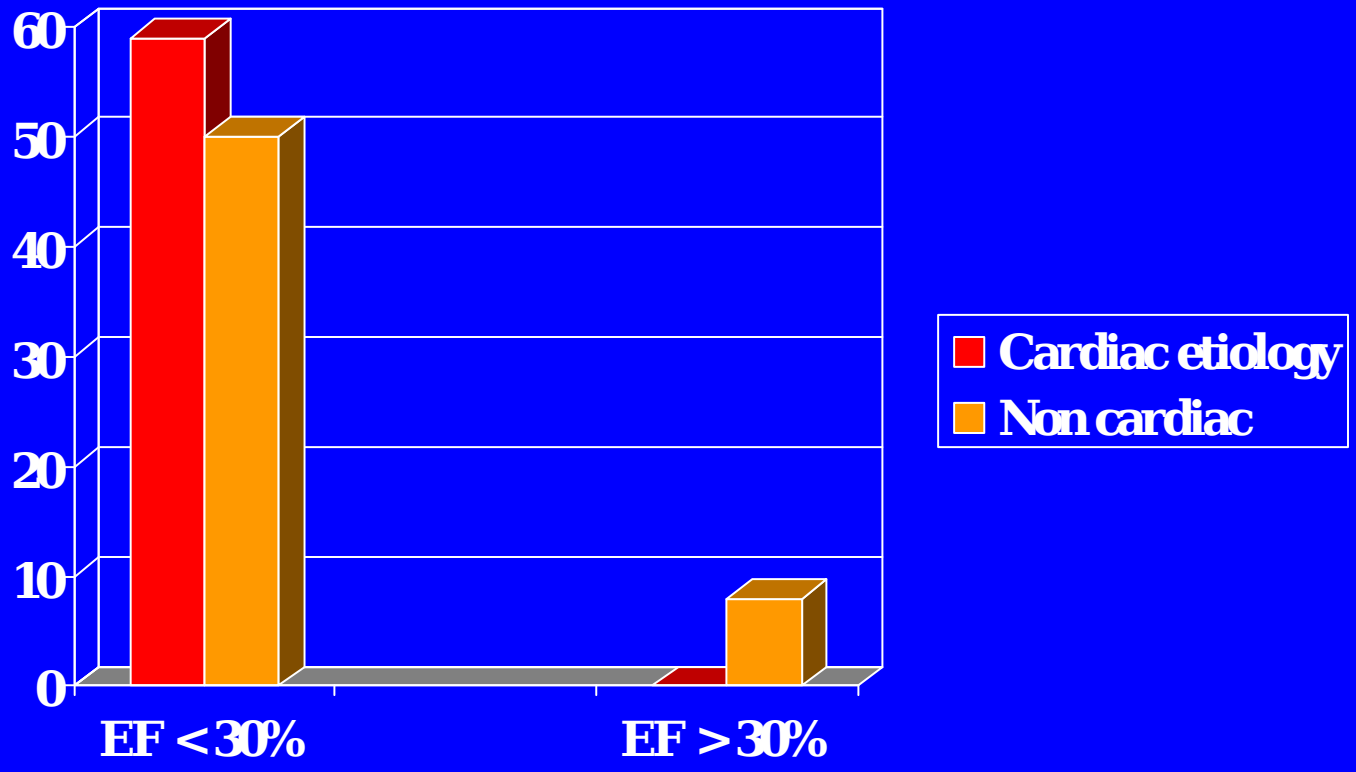
Middlekauf et

Predictive value of LVEF

- 9 pts with sudden death
  - 90% with ef< 30%

Middlekauf et

Predictive value of LVEF
% of pts with scd



Middlekauf et

Predictive value of LVEF

- Sick group
  - 75% with structural heart disease*
  - 7% underwent heart transplant over next 3 yrs

AHJ,1993

Predictive value of LVEF

- Conclusion:
  - risk for sudden death is dependent mostly on lvef.

AHJ,1993

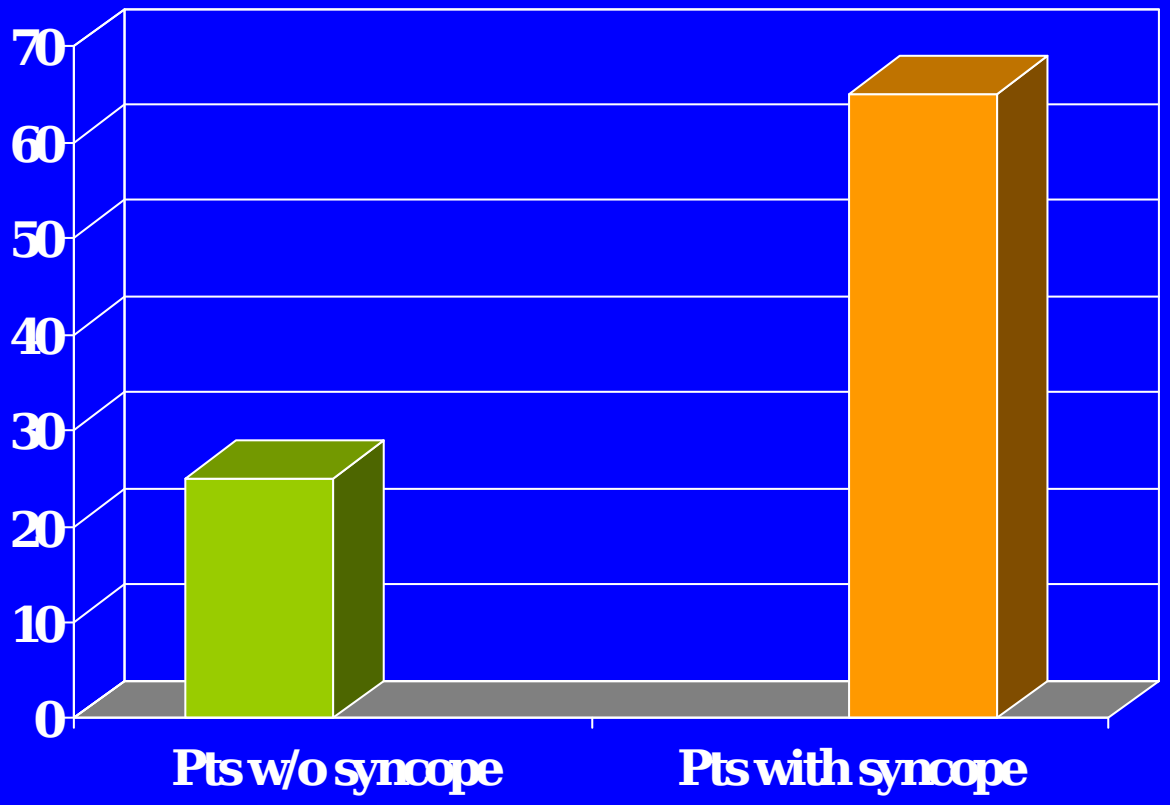
Prognostic value of syncope in pts with chf*

- 491 pts referred for tx of chf
  - ef ~20%
  - nyha 3-4
  - ischemic cardiomyopathy ~50%
  - non-ischemic cardiomyopathy ~50%
- 60 pts with h/o syncope
  - compare mortality at 1 yr with other pts
    - scd
    - death from all causes

Middlkauf et

Prognostic value of syncope in pts with chf

Mortality at one year



JACC,199

Prognostic value of syncope in pts with chf

- Increased mortality in pts with syncope due to greater risk of scd.

- Prognostic significance similar regardless of:
  - cardiac vs noncardiac etiology
  - eps results
  - tx with meds or pacemaker

JACC,199

Prognostic value of syncope in pts with chf

- Limitations of study
  - retrospective
  - only one pt received aicd
  - may not apply to pts with less severe chf

JACC,199

Prognosis based on GXT

- Identifies
  - ischemic heart disease
  - exercise induced arrhythmias
- NO DATA on pts with syncope

Additional studies

- Carotid massage
- Ambulatory monitoring
- Tilt test
- SAECG
- EP study

Evaluation of unexplained syncope: Recurrent episodes

- Frequent
  - holter or loop monitor
  - tilt test
  - psychiatric eval
- Infrequent
  - tilt test
  - psychiatric eval

Evaluation of unexplained syncope: Recurrent episodes

- Ambulatory monitoring*
  - holter monitor
    - useful if sx recurrent within ~72 hrs
  - loop recorder
    - useful in pts expected to have sx within ~1 month, who would not be able to use event recorder
  - event recorder
    - useful if sx too infrequent to justify leads of holter
    - best for pts with prolonged lightheadedness
  - implantable loop recorder
    - episodes too infrequent for typical loop recorder
      - precludes lead irritation

Evaluation of unexplained syncope: Recurrent episodes

- Ambulatory monitoring*
  - findings in normal people
  - ~6,000 pts
    - 55% men, 45% women
    - asymptomatic
    - no hx of heart disease
    - monitored for 1 hr

Evaluation of unexplained syncope: Recurrent episodes

- Complex ventricular arrhythmias on ambulatory monitoring*

	men	women
< 60 yo	5%	7%
60-70 yo	18%	12%
> 70 yo	35%	25%

Syncope

"Cardiac" etiologies

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Kapoor;Medicine 19

Tilt test

- Provides evidence of susceptibility to neurocardiogenic syncope
- Specificity ~90%
- Reproducibility ~75%
  - mainly due to poor positive concordance
  - negative concordance ~100%

Benditt et

Tilt test

- Protocol
  - supine for 30 mins
  - tilt angle 60-80 degrees
  - duration 30-45 mins
  - provocation with isoproterenol, ntg, edrophonium, adenosine

Benditt et

Indications for tilt test

- General agreement (assumes structural heart disease or other causes of syncope ruled out)
  - recurrent syncope
  - first episode, in pt at high risk
  - exertional syncope
- Differences of opinion
  - recurrent dizziness, falls
  - peripheral neuropathy or dysautonomias
  - repeat test to evaluate therapy

Benditt et

Indications for tilt test

- Test not warranted
  - single episode in pt at low risk, when clinical features clearly support dx of vasovagal etiology
  - definitive dx of another etiology
- Test contraindicated
  - critical aortic or mitral stenosis
  - severe ascad
  - critical cerebrovascular disease

Benditt et

Ambulatory monitoring

EP study

Orthostasis

- Fall in SBP >20 mmHg supine-to-standing
  - maintain supine for 5 mins
  - measure immediately, then qmin X 2, or if symptomatic.

Orthostasis

- Seen in ~30% of pts presenting with syncope
  - maybe contributor, but not always causal
  - maybe associated with supine hypertension

Orthostasis
Pathophysiology*

- autonomic insufficiency
  - primary or secondary
- associated htn and cerebrovascular dz
- altered autoregulation of cerebral blood flow
- volume depletion, sodium loss
- venous pooling
- meds

Orthostasis
Treatment

- underlying cause
- compression stockings
- increased dietary sodium
- fludrocortiscon
- midodrine
- clonidine
- fluoxetine
- (pacemaker?)

Vasovagal

- Beta blockers
- Disopyramide
- Scopolamine
- Theophylline, aminophylline
- Ephedrine
- Midodrine (a-1 agonist)
- 5HT uptake inhibitors
- Pacers

Vasovagal

- Beta blockers

Vasovagal

- Pacemakers (JACC 1999)
  - North American Vasovagal Pacemaker Study
    - 54 pts with >6 episodes loc, + HUT, relative brady
    - randomized (pacer vs none)
    - stopped prematurely due to benefit of pacing
      - controls : 70% syncope
      - pacers: 22% syncope
    - time to first recurrence:
      - controls: ~4 mos (112 days)
      - pacers: ~2 mos (54 days)

Cardiomyopathy

- Unexplained loc in pt with nonischemic cardiomyopathy
  - increased risk of death
    - 45% at 1 yr
      - vs 12% in pts with similar dz, without syncope*

JACC,1993

Cardiomyopathy

- Empiric use of AICD: (JACC 1999)*
  - 14 pts, with neg ep
  - mean f/u 2 yrs
    - 50% had aicd shock appropriately
      - (~same as for pts with aicd for scd)
    - ~30% mortality
      - (~same as for pts with aicd for scd)

Syncope
Mortality at 1 year

causes	SCD	all
Cardiac	15%	25%
Non-cardiac	3%	5%
Unknown		

Kapoor;Medicine 1990

Syncope
Mortality at 5 years

	SCD	all causes
Cardiac	30%	50%
Non-cardiac	5%	25%
Unknown		

Kapoor;Medicine 1990

Outline

- Definition
- Pathophysiology
- Management
  - vasovagal
  - orthostasis
  - cardiomyopathy

Syncope evaluation

Directed studies suggested by initial eval

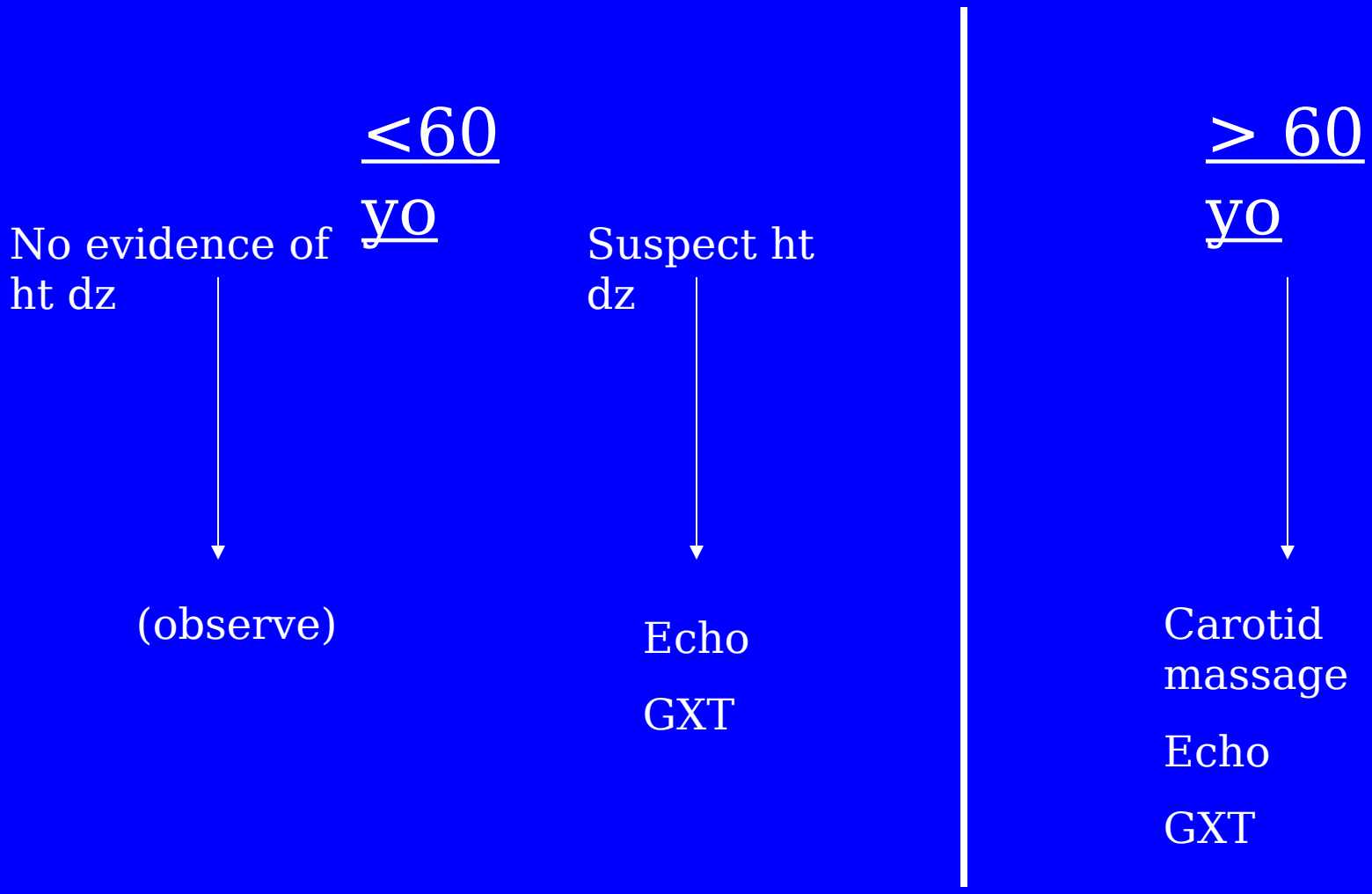
1. Cardiac
   - -echo
   - -monitor
   - -saecg
   - -ep study
   - -gxt
2. Non-cardiac
   - - tilt test
   - - head ct/head mri
   - - eeg

Utility of Echo

- 59 pts with lvef < 50%
  - 12 missed by physicians (20%)
- 14 pts with lvef < 20%
  - 3 missed by physicians (21%)
- 27 pts with severe aortic stenosis
  - 3 missed by physicians (11%)

Krumholtz et

Syncope unexplained after H&P, Ecg*: 1st episode



ACP,1997

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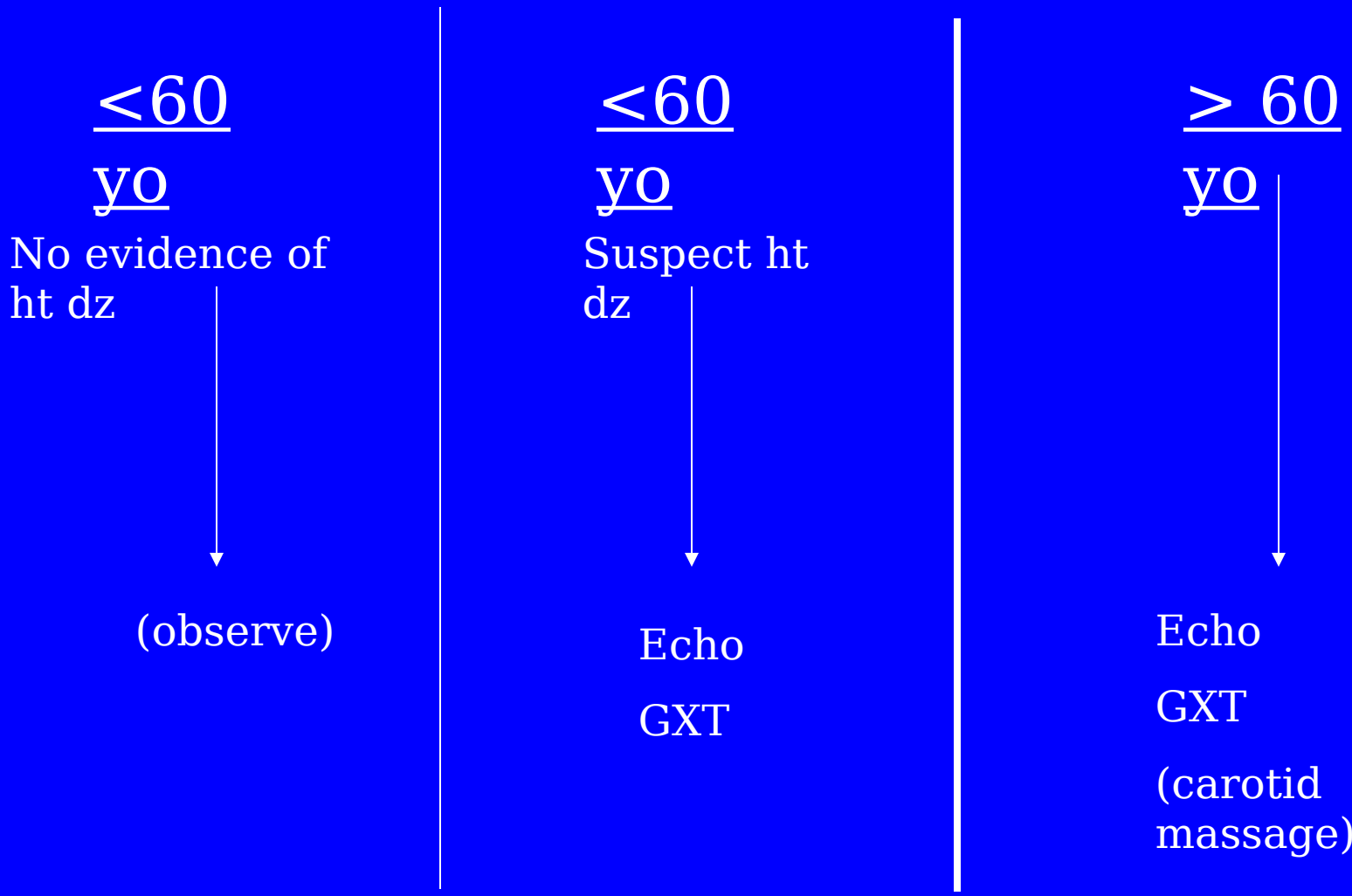

ACP,1997

H&P

- How well can structural heart disease in pts less than 60 yo be identified by h&p?
  - substrate for arrhythmias
  - mechanical obstruction
  - acute mi

Prognosis based on Echo

- Primarily a matter of lv function, since if echo is diagnostic (e.g., AS, myxoma, etc.), then syncope is no longer the main concern (I.e., we have attained the goal of identifying the underlying disease, with its attendant prognosis and management).